Intro to Logic
Fall 2007 Final Exam

Section I. Predicate Logic Translations. Translate each of the following sentences into predicate logic notation, using the designated predicate letters. (10 points each)

1) Zachary is a logic instructor, a Ham Radio operator, and a pianist, but he is not a Jack of all trades. (Lx, Hx, Px, Jx, z)

2) There is nothing new under the Milky Way. (Nx, Uxy, m)

3) Not all freshmen students will pass this course. (Fx, Sx, Px)

4) Students will pass the course if and only if they pass the final exam. (Sx, Cx, Fx)

5) No decent person loves anyone who loves himself. (Dx, Px, Lxy)

6) If there are any sea lions that are swimming, then there will be some poachers that are hunting them. (Lx, Sx, Px, Hxy)

7) All people who study logic recognize some sound arguments. (Px, Lx, Rxy, Sx, Ax)

8) Heidegger is neither Camus nor Kierkegaard. (h, c, k)

9) The only three people who are Logic TA's are Brian, Ben and Daniel. (Px, Lx, b, e, d)

10) All Presidential candidates except Hillary Clinton are male. (Px, Mx, h)

11) The greatest philosopher living in the twentieth century was Wittgenstein. (Px, Lx, Gxy, w)

12) There are at most two senators from Nebraska. (Sx, Nx)

13) There are at least two foreign governments that are democracies. (Fx, Gx, Dx)

14) There are exactly two quantifiers in predicate logic. (Qx, Px)

15) The inventor of the Morse Code was Samuel Morse. (Ixy, m, s)

Section II. Predicate Logic Proofs. Complete a proof for each of the following arguments to show its validity. (50 points each)

1) 1. $\exists x \exists y(Fx \bullet Myx)$
2. $\forall x \forall y[Mxy \rightarrow (Qx \bullet Tyx)]$ / $\exists y \exists z[(Fy \bullet Qz) \bullet Tyz]$

2) 1. $\forall x \forall y[(Nx \bullet Oy) \rightarrow Pxy]$
2. $\exists y[Ry \bullet \forall z(Sz \rightarrow Pyz)]$
3. $\forall x \forall y \forall z[(Pxy \bullet Pyz) \rightarrow Pxz]$
4. $\forall x(Rx \rightarrow Ox)$ / $\forall z \forall y[(Nz \bullet Sy) \rightarrow Pzy]$

3) 1. $\exists x \forall y(x=y \equiv Ky)$ / $\exists x(Kx \bullet Oxx) \equiv \exists x \exists y(Kx \bullet Ky \bullet Oxy)$

Extra Credit: Translation and Proof. Translate the following argument into logical notation. Then show that the argument is valid using a proof. (15 points)

Some persons are enemies of every person they loathe. Every person loathes someone other than himself. Therefore at least one person is an enemy of someone. (Px, Exy, Lxy)